Date of Meeting: April 23, 2007

BOARD OF SUPERVISORS'
PUBLIC SAFETY COMMITTEE
ACTION ITEM
BOARD MEMBER INITIATIVE

#5

SUBJECT:	**Proposed Zoning Ordinances to Regulate the Approval of Non-Conventional On-Site Sewage Systems**
INITIATED BY:	**Jim Burton**
ELECTION DISTRICT:	**Countywide**

BACKGROUND: According to Loudoun County Loudoun County Health Department staff, 2,966 non-conventional septic systems have been approved of which some 1,565 have been installed. These approvals have occurred despite local anecdotal evidence and academic research indicating that many of these systems have had a startlingly high failure rate during their first few years of operation (see Appendix 1), a lack of analysis on what potential financial and legal liability the County might assume in approving these systems, and, as yet, no County ordinance or administrative oversight to ensure their proper maintenance and operations. Based on data provided by Health Department staff for the period between 2003-2007, these systems have experienced a failure rate approximately one-and-a-half times that of conventional systems while reported failure rates during the first 3 years of operation are approximately twice that of conventional systems.

The Virginia Department of Environmental Quality ("DEQ") believes that the numbers collected by County Health staff may be far lower than the actual number of failing systems as it only includes those failures reported by the homeowner to the Health Department. Further, there is limited data indicating the average age of the system when it failed. However, based on available data, one could demonstrate that the long term failure rate of these non-conventional systems may be as much as 8 times greater (see Appendix 2). As a result, Public Health officials have publicly expressed concerns that without regulation Loudoun may very well face an eminent threat to public health.

Why They Fail: Non-conventional onsite septic systems fail for a number of reasons, including poor design, poor installation, and homeowner neglect. Homeowner neglect, however, is the primary reason. Unlike conventional systems, which can operate for years without maintenance

and need only to be pumped once every three to five years, non-conventional onsite systems require maintenance at least every year and constant homeowner monitoring. Systems that use media filters, aerobic treatment units, and chemical disinfectants, among other things, need maintenance even more often.

Many people, who move to the County from places where they have public sewer, are used to putting diapers and paper towels down the toilet and grease down their in-sink garbage disposals. These items destroy non-conventional onsite systems very quickly. Furthermore, many systems that are generally permitted throughout Virginia are not really suitable for the colder regions of Northern Virginia and tend to work poorly during the colder winter months.[1] This reduces the margin for error by the homeowner and increases the failure rate when the systems are neglected or misused.

ISSUES:

Public Health: Failing septic systems put County citizens at risk for diseases such as salmonella, shigellosis, cholera, viral hepatitis A, sporadic viral gastroenteritis, epidemic viral gastroenteritis, and amoebiasis. In short, the result can be serious illness.

Financial Impact: Overseeing, inspecting and mitigating the impact of non-conventional systems will be a significant financial problem going forward for Loudoun County. For non-conventional onsite sewage systems the legally required soil and site conditions are not as stringent as for a traditional septic tank and drainfield. Thus, non-conventional systems allow home construction on sites that would be impossible to develop with a conventional drain field. As non-conventional systems proliferate, the sheer number of septic systems (both conventional and more innovative systems) in the County will vastly increase. Supervising these systems will result in huge and unforeseen administrative costs.

As residential density in the County increases and more systems fail, ultimately the burden will fall on the County to fix these systems or the problems created by them. The pollution, public health hazard, and cleanup, not to mention the smell, of failing non-conventional onsite systems will ultimately lead to citizens demanding that the County come up with a solution. Replacing or repairing a failed system can cost anywhere from $10,000 to $50,000. Multiplied by even as few as 100 systems failing per year, the financial impact is prohibitive. The County has already been forced to step in when septic systems failed in the communities of Aldie, Broad Run Farms, Hamilton, Tall Oaks, Dulles Industrial, and Willisville. This problem will only become more acute as non-conventional systems proliferate.

Environmental Impact: The high failure rate of the non-conventional onsite septic systems will make an already growing problem worse. According to the DEQ, one of the major reasons

[1] The Health Department did not agree with this statement in their review of this item, noting that "this particular technology referenced in the past by others was developed in Wisconsin and extensively used across the northern plains." (see Appendix 3). However, the paragraph above does not reference a particular system, referring instead to the more general "many," while the comment does not indicate whether all non-conventional systems used in Northern Virginia were developed and tested in the Northern Plains or just the one mentioned in the comment as being developed in Wisconsin.

for the high fecal bacteria count in the Goose Creek watershed, including high concentrations of *E. coli* bacteria, is failing septic systems. Goose Creek is not only a scenic recreational area, it is also a significant source of drinking water. DEQ has also identified high bacteria levels in Catoctin Creek. Loudoun County is also a part of the Chesapeake Bay watershed and, therefore, has a duty to help preserve the Chesapeake. Sewage has reputedly been a cause of algal blooms and outbreaks of *Pfisteria* bacteria in the Bay. Continuing to allow wide spread use of septic systems that have been shown to be unreliable would be irresponsible in such an environmentally sensitive locale.

CONCLUSION: Non-conventional onsite sewage systems present a serious problem to Loudoun County. They have adverse financial, public health, administrative, and environmental impacts. They can easily become, and all too frequently do become, public nuisances.

It is far wiser, far more fiscally prudent, far healthier, and far more environmentally sound to prevent such a problem from occurring than to attempt to fix it once it has occurred. As a result, several Virginia counties, including Clarke and Culpeper Counties, place restrictions on the approval and installation of such systems. Once such systems are installed, other Virginia counties, such as Augusta County, regulate their maintenance and upkeep. County staff have conducted numerous meetings with various stakeholders and other local governments to develop non-conventional means of regulating those systems once installed. These non-conventionals were presented to the Board in June 2006 with a commitment to return to the Board in September 2006 with final language and implementation recommendations for consideration during the FY'08 budget discussions..

At this time, no action has yet occurred on the 1066 amendments nor were staffing or other resources appropriated to implement the programming associated with those regulations. However, given the high failure rate due to misuse, the delay in passing ordinances and installing the appropriate managerial and software systems to regulate the systems, the unknown liability to the County, and the detrimental impact to the health of citizens and the environment when such systems fail in large numbers, it seems that restricting their use in the County at this would be justified. The attached proposed ordinances do just that.

DRAFT MOTION: I move that the Public Safety Committee forward the proposed ordinances to the Board of Supervisors with a recommendation that the Board immediately initiate the public process for their adoption. I further move that the Public Safety Committee request that the County Attorney prepare the necessary language to initiate the public process for use by the Board at that meeting.

ATTACHMENTS: Attachment 1 – Washington Post article
Attachment 2 – Failure Rate Calculations
Attachment 3 – Health Department Comments
Attachment 4 – Proposed Draft Ordinance

STAFF CONTACT: Mary Bathory Vidaver, x0210
Reviewed by Health Department, County Attorney's Office

ATTACHMENT 1

washingtonpost.com

An Odorous Matter in Loudoun County

Sewage System Failures Disgust, Anger Residents

By Michael Laris
Washington Post Staff Writer
Sunday, July 17, 2005; C06

After Diana Johns moved into an elegant new home 40 miles west of Washington, her sophisticated septic system -- which uses peat imported from Ireland to clean human waste -- morphed into a goopy green mess that sent sewage flowing onto her lawn.

For Falguni Patel, it was the mixture of suds, grime and urine flowing for months down her just-planted grass and the flies and mosquitoes the fetid discharge lured outside the French doors of her million-dollar house that caused alarm.

Expensive individual sewage treatment systems, which allow builders to squeeze more homes into once-rural areas across the United States, are failing in an array of new subdivisions across Loudoun County, according to a review of public records and interviews with residents.

Fueling the problem are vast financial incentives to build more homes more quickly in one of America's most lucrative housing markets and, builders say, confusion by owners who are used to simply flushing -- not systems that require maintenance. Sewer lines are expensive and have generally been kept out of western Loudoun to prevent urbanization.

The result has been numerous freshly built houses with failing systems, some of which have expelled tens of thousands of gallons of untreated or partially treated waste, polluting the environment and endangering human health.

"We're just afraid this is the tip of the iceberg," said Joe Lock, a Loudoun septic enforcement official. "What about the ones we don't know about?"

As booming population growth, migration to warmer climes and better jobs and the allure of rural scenery continue to spur development on the outskirts of America's metropolitan areas, a third of all new U.S. homes are being built with septic or other on-site systems, rather than the central sewer lines that have served urban areas for decades.

Boosters of conventional septic tanks and newer, more elaborate options cite the efficiency of dispensing flushed waste right outside a residence rather than miles away down expensive pipes. They also tout the environmental benefits of using advanced systems, which in some cases pump out water clean enough to drink.

"Even the president has one," said Linda Hanifin Bonner, executive director of the National Onsite Wastewater Recycling Association Inc., an Anne Arundel-based lobbying group, noting that the leader of the free world relies on one of her members' systems at his Crawford, Tex., ranch. The company's slogan: "Don't Pollute -- Install a HOOT!"

"Let's just say the future is very good for the on-site industry," Bonner said.

But that's not the story Barry Gibb tells standing behind his grand new home west of Leesburg in the Beacon Hill subdivision.

Gibb runs a general contracting business in Loudoun and is trained in electrical and plumbing work. He just upgraded his oversized lawn with a pool and spa for $140,000. But all he talks about over the trickling sounds of his new, chlorinated waterfall is the stench from the special, air-pumped sewage treatment system poking up from the grass nearby.

"You've got a million-dollar home. You've got a swimming pool in the backyard. You don't want to smell doo-doo," he said.

Gibb has been working as a builder in Loudoun for 20 years. So far, he said, neither his home builder nor the installer has solved the problem, leaving him holed up indoors rather than poolside.

"The way Loudoun County is building so fast, there's not enough good help. It's being slapped up," Gibb said. "Everybody's just cashing in and making a quick buck."

James S. Williams, executive vice president of the Northern Virginia Building Industry Association, said he has not heard concerns about widespread problems with systems but said that warranty programs should cover work, if necessary. "The purchaser is not too innocent going into these things, because he's done it with his eyes wide open," Williams said. "A lot of people who blame the problems on the builders haven't maintained the systems."

Across the street from Gibb's house at a recent block party, complete with pepperoni pizza, lemon bars and 13 kids tossing water balloons and splashing in a kiddie pool set up on the driveway, Vashti Curtis recalled her own problem.

She discovered it when Duke, the family's Labrador retriever, returned home, reeking and sick, after eating from a cracked pipe in their new-fangled septic system, which sits in the middle of her lawn.

"It's bubbling brown water. . . . I mean, it was real poop water," Curtis said. Duke "kept having diarrhea over and over and over again. I didn't know what it was. Thank God my kids didn't play out there."

Identifying the cause of such problems often requires a nose for sleuthing. A computer panel will short out. A distribution pipe will freeze. A filter will clog. A bulldozer will crush underground pipes. The possibilities can be seemingly endless, as can the finger-pointing.

"That's what's hard. It's like being Colombo all the time. 'Who destroyed what?' " said Joe Lock, who has spent years poking around the ooze of Loudoun's boom. "You have to take it all in and say, 'Is this what's really going on?' Sometimes it's what people don't say."

More than a half-dozen major participants are involved with a typical system. A soils specialist tests the ground. An engineer comes up with drawings matching a system to a specific landscape. Then there's the manufacturer, the home builder and the builder's installer. Officials must sign off. And residents decide what raw materials go down.

In traditional septic systems, household waste drains to an outside tank, where bacteria begin to feast and solids settle to the bottom. Liquid waste is piped out underground, where organisms in the soil keep

working to clean it. Alternative systems rely on blowers, pumps, computer controls or various filters to better clean the effluent so it can be released into soils that couldn't safely absorb it otherwise. Sewer lines take waste to industrial treatment plants.

At least four recently built subdivisions in western Loudoun have had multiple residences with failed systems, according to health records and interviews: Beacon Hill and Shenstone Farm, both near Leesburg; Hamilton Station Estates outside the tiny town of Hamilton; and Chartwell Estates farther west.

The homes were constructed by leading national and regional home builders, including Pennsylvania-based Toll Brothers, K. Hovnanian Homes in New Jersey, NVR Inc. in Reston and M/I Homes, among others. They included numerous brands of septic and other on-site systems and a variety of installers. Representatives from Toll and NVR declined to comment, and no one from Hovnanian returned calls. An M/I vice president said only one of the company's septic systems had problems, and he blamed those partially on the homeowner.

Four days after moving into their new home in the Shenstone subdivision on Christmas Eve, Aaron Zeitlin, who works in the mortgage industry, and his pregnant wife, Hanh Chau, a veterinarian, were giving their 2-year-old son a late-night bath in the oversized tub in the master bedroom. Zeitlin heard water falling as he headed downstairs to shut off the lights.

"I could see water flowing out over the toilet -- material and all -- just really nasty stuff," Zeitlin said. He yelled for his wife, who was supposed to be on bed rest, to bring towels as it poured out on the hardwood floor in the hall and into the playroom. "She's standing there, in flip-flops, cleaning the stuff up. I hollered at her to get out. My 2-year-old is walking around in it with bare feet."

Workers with heavy equipment had rolled over their septic pipe to move earth behind the house before they moved in, stopping up the flow to the outside. The draining bathwater had pushed it over.

Falguni Patel and her husband, Rajesh, a real estate agent, said they were confronted with wastewater swishing past their window each morning as they peered out toward the sun for their Hindu prayers.

In other cases, it is the sensitivity and uncertainty of the new technology that gets homeowners rankled.

The high-pitched, high-decibel beep blaring inside Diana Johns's house started three months after she and her family moved in. It meant something was amiss with her yard's miniature sewage plant.

The alarm signaled that the family seemed to be using too much water for the peat-based sewage system to handle. She has four sons and was doing three loads of laundry a day. She also was running the dishwasher and the garbage disposal that her builder, M/I homes, had installed.

County officials came to investigate. They found evidence of high water usage but contradictory evidence of high waste concentrations. Searching for an explanation, they noted in county files that her kids often took antibiotics, making the officials wonder whether that might affect the system. A technician seemed to be joking when he quizzed her about possible criminal behavior, Johns said.

"At one point, they asked me if I had a meth lab in my house. I've never even smoked pot in my life," she said. They told her not to use her fabric softener or harsh cleaning products. "If they had said, 'You can't use these items,' I may not have bought this house. I can't live without my Downy and my fluffy towels."

Scott Donelson, an M/I homes vice president, said residents can't have unlimited expectations when they move to a setting served by on-site systems. He said the Johns case is the only instance he knows of in which a system in one of the company's homes in Loudoun had failed. It spent thousands of dollars to start over with new peat.

"They do work well," he said of the on-site systems. "I'm really confident in them if -- and the big qualifier on those is if -- the operator or homeowner doesn't try to exceed its limitations," Donelson said. "If you asked your Ferrari to go four-wheeling in the mountains, it probably wouldn't last too long."

Johns said she isn't sure whether she used too much water for the system but is certain she didn't do anything wrong. Still, she said, she uses paper plates for the kids to cut water usage and is choosier about whether to do laundry. "I do smell the clothes to make sure they are actually dirty. I never, ever would have considered that before."

ATTACHMENT 2

	Conventional Systems	Non-Conventional Systems
Total Number Installed	12,596	1,565
Number of Failures (11/1/03-4/1/07)	79	18
Failures Per Year	24	5
Annual Failure Rate	0.2%	0.3%
Assumed Age at Failure (in Years)	25	5

If the failure rate of non-conventional systems is 1.5 times higher than conventional systems in one-fifth the number of years, after 25 years (the life of a conventional system) the failure rate of non-conventional systems is eight (8) times that of conventional systems.

If the installed base of non-conventional systems were as large as the 12,596 conventional septic systems that we have today, at the end of 25 years, instead of the 24 or so failures per year we are seeing with traditional systms, we would be seeing almost 200 non-conventional septic system failures per year.

	Conventional Systems	Non-Conventional Systems
Number of New Installations (1/1/03-3/31/07)	1,200	642
Number of Failed New Installations (1/1/03-3/31/07)	3	3
New Installation Failures Per Year	0.7	0.7
Annual New Installation Failure Rate	0.06%	0.11%

The failure rate of newly installed non-conventional systems is almost twice that of newly installed conventional systems. Thus, we can expect that an increase in the number of non-conventional systems installed each year will result in an increase in the number of failures of those systems.